

NOTES ON *ORCHESTES RUFIPES* LEC., IN NEW JERSEY.

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According to Blatchley and Leng¹ this weevil is known to occur in New York, Vermont, Massachusetts, Newfoundland and Quebec. At Batavia, N. Y., according to H. H. Knight, it was abundant on the shining willow *Salix lucida*, the adults feeding on the leaves, July 1 to 15, the larvæ mining the leaves in August and September; other species of willow in the same locality were not infested. Gibson² states that in Ontario an outbreak of *rufipes* occurred locally on willow toward the end of May and during the first half of June at the Experimental Farm; beetles were first noticed on the laurel-leaved willow *Salix pentandra* on May 31, and were quite numerous by June 15, and their work noticeable. In one leaf, two and one quarter inches long and one inch wide, 329 feeding holes were counted. The species is not recorded in Smith's List of the Insects of New Jersey, although it is known to occur on *Salix lucida* and also on black willow *Salix nigra*, at Rutherford, where all of the observations recorded in this paper were made.

In New Jersey the beetles go into hibernation about the latter part of September and first of October, selecting such places as under loose bark, in partly dead wood, in dry stumps of limbs, etc. Here they may be found in colonies of varying numbers, depending on the size of their hibernation quarters. If suitable weather prevails a few beetles will emerge about the middle of April or even before and can be found crawling over the bark. Feeding soon takes place and by the last of April and first of May noticeable damage is being done to the leaves. Even at this early date many leaves will be brown and dry if the beetles are numerous. Feeding continues all during May, interrupted by copulation during the latter half of this month. Eggs are deposited during the last of May and first part of June, and by the middle of June hatching is under way and small mines are visible. By the last of June the mines, together with the larvæ, are good-sized and much in

¹ Rhynch. N. E. Amer., p. 282, 1916.

² 41st Ann. Rept. Ent. Soc. Ont., p. 15, 1910.

evidence. Practically all of the adults disappear by the middle of June. The mining of the foliage continues until about the end of the first week of July, at which time most of the larvæ are full grown and pupation is starting. This takes place within the mine, requiring about a week or ten days. By the middle of July many beetles are out and by the last of July the entire brood is in evidence, feeding on such green foliage as escaped the ravages of the larvæ and the hibernating brood of beetles. Feeding continues until cool weather forces the beetles to seek winter quarters.

As has been stated before, a noticeable browning of the foliage starts about the last of April or first of May. As the feeding increases so does the injury, and by the time the mines are starting much of the foliage is brown and dead. The larvæ complete the destructive work, and by the end of July infested trees have the appearance of having been swept by fire.

The adult eats a hole usually through the lower epidermis and then consumes the tissue and juices between the upper and lower epidermis for a short distance around the original opening. This results in a little circular or oval hollow area in the leaf along the inner edge of which is the opening through which the beak was inserted. Later, the lower epidermis over the hollow space dries and falls off. This leaves a depression on the under surface. Still later the upper epidermis over the eaten portion becomes brown, dries and cracks, and this may result in a hole through the leaf. The injury really consists of a skeletonizing of the leaf from the lower surface, but it is not accomplished directly as in the case of most skeletonizing by other species. In severe infestations the feeding punctures are so close that the entire leaf is covered by them.

The eggs are inserted singly anywhere under the lower epidermis in irregular oval cavities, which resemble feeding punctures. The tissue above and below the egg becomes brownish. The female cuts nearly a complete circular slit in the lower epidermis, leaving enough tissue for a hinge. This circular flap is pushed to one side and an irregular oval area cleaned out. This results in a somewhat oval cavity with the opening at one end. The egg is then inserted and the flap closed. Eggs were found in young and old leaves, even when they were considerably injured by feeding.

The completed mines are blotch-like and usually extend from the midrib to the edge of the leaf, occupying from one-sixth to one-fourth of the entire leaf surface. They are visible plainest from the upper surface, where they appear as brownish, discolored, dead areas. As a rule, there is only one larva in a mine, but in many cases the mines merge, so that the entire leaf consists of a solid mine containing numerous larvæ. Many leaves contained from seven to twenty-two small mines. On account of the merging of some of these, and on account of the death of some of the partly grown larvæ, only from three to five completed large mines were found in most of the leaves at the end of the season.

EGG. Length, 0.32 mm. Width across middle portion, 0.2 mm. Oval, ends broadly rounded; translucent, somewhat whitish.

LARVA. Length about 3.7 mm. Width of thorax about 1 mm. Form subcylindrical, thoracic segments wider than abdominal ones, body tapering slightly from thorax to posterior portion of abdomen. Segmentation distinct. Whitish except for a median dorsal and ventral row of abdominal spots, the head and thoracic shield which are brownish (young larvæ is greenish-white, translucent). Head small, subcircular, sparsely hairy; collum absent; epicranial halves separated dorsally by faint median suture; front large, triangular; gula membraneous, indistinct; mouth parts small. Labrum triangular with truncate apex, anterior edge fringed with chitinous hairs. Mandibles broad across basal three-fourths, apical fourth narrow, acute, entire. Labium transverse with mentum and submentum fused, indistinct, anterior edge arcuate. Maxilla fused with labium to near apex, lacinia simple fringed with chitinous hairs on inner distal surface; maxillary palpi two-jointed. Thoracic shield transverse, covering most of prothoracic dorsum. Mesothorax and metathorax wider than all other segments. Sides of thoracic and abdominal segments produced laterally. True legs absent. Cerci absent. Anal segment wart-like. Body hairs short and sparse, more apparent laterally.

PUPA. Length about 2.6 mm. Oval, white to brownish black. Posterior dorsal portion of prothorax bearing prominent chitinized hairs, a transverse row of ten arising from dark, tuberculate bases, five on either side of middle. Dorsal posterior portion of abdomen terminated by a pair of upward-directed, stocky tubercles, tipped

with sharp chitinous points. Dorsal surface of abdomen and metathorax bearing a few minute hairs. Head and snout bearing several chitinized hairs. A single prominent chitinized hair arising from distal portion of each femur. Wing cases with longitudinal striae. Each abdominal segment with a pair of dorsal foveolæ, one on either side of the middle.

ADULT. *Orchestes rufipes*. This was described by LeConte in 1876 (Proc. Am. Phil. Soc. Vol. XV, No. 96, p. 208) from Vermont specimens. The original description follows:

"Black, very thinly pubescent, with fine whitish hairs; beak finely punctured, head punctured, front narrow but distinct; prothorax finely punctured; elytra oval, rather flattened, deeply striate, interspaces rugosely punctulate. Antennæ and legs yellow, hind thighs dusky, very slightly incrassated; funicle six-jointed, second joint scarcely longer than the third; thighs not toothed; claws broadly appendiculate. Length 2 mm.; .08 inch."

Should it be desirable to control this insect, spraying with arsenate of lead is recommended. The poison should be applied to the lower leaf surfaces during the last of April or first of May. On account of the length of time during which the adults feed before depositing eggs, almost complete killing should be accomplished.